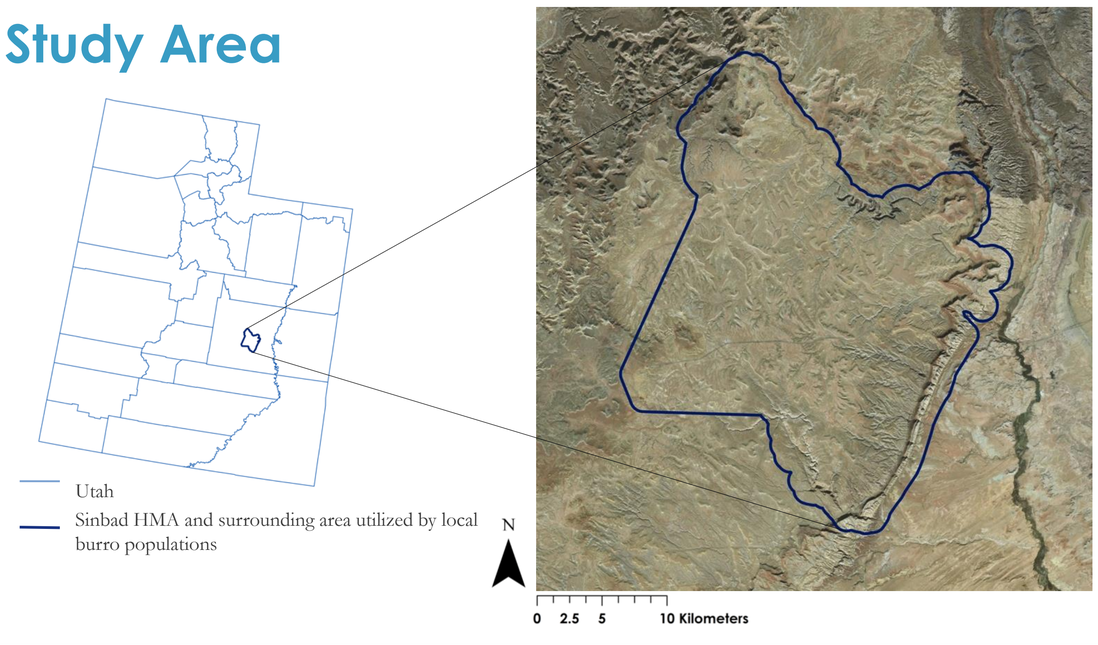
Utilizing Landsat to Detect Ephemeral Water Sources in Support of a USGS Feasibility Assessment and Management Strategy of Equids

Abstract

Since 1971, federal agencies have been tasked with managing burros in federally-designated herd management areas (HMAs). Because these areas are often large and remote, obtaining sufficient data on horse and burro populations and habitat preference can be difficult and expensive. In recent years, the United States Geological Survey (USGS) has partnered with the Bureau of Land Management (BLM) to study the population dynamics and habitat preferences of wild horse and burro populations on the Sinbad HMA in central Utah. Researchers at the USGS and BLM hypothesize that surface water is potentially an important factor in wild horse and burro habitat selection, thus these agencies are interested in determining how water availability affects species' movement in both time and space. NASA DEVELOP leveraged NASA Earth observations and pre-existing water availability data to determine the spatial and temporal distribution of water on the landscape. Maps were developed to help researchers create habitat selection models for wild horses and burros on the Sinbad HMA and elsewhere.

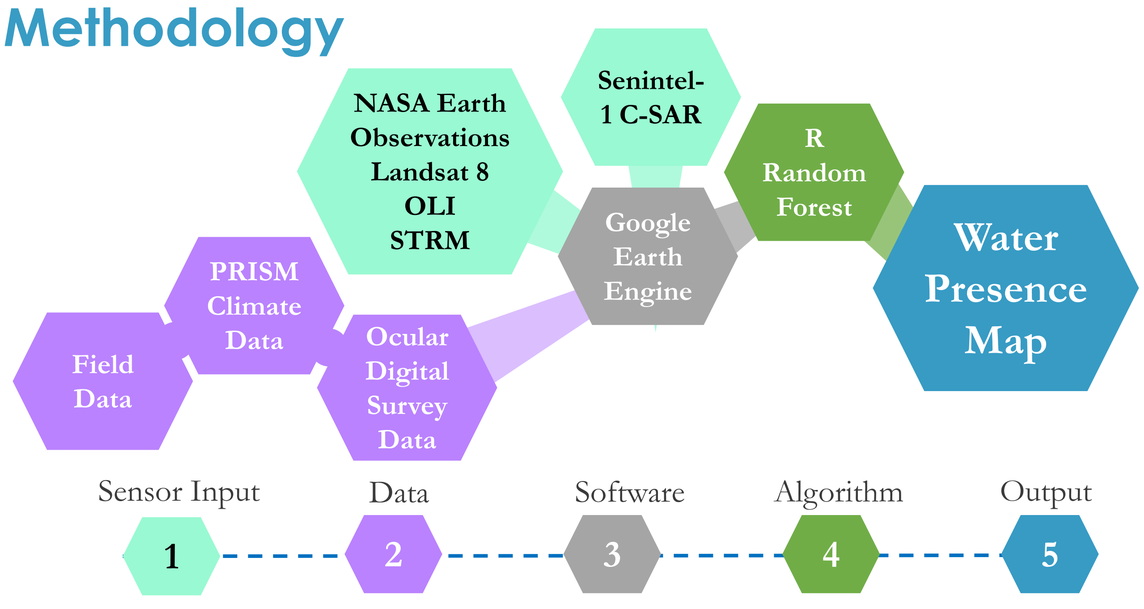
Study Area



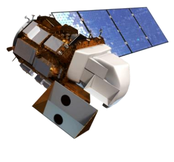
Objectives

- **Develop** temporally-explicit water detection maps that identify the presence of ephemeral water sources in Sinbad HMA
- **Evaluate** model utility and map accuracy by comparing our results with pre-existing surface water maps and field observations
- **Generate** a modeling tutorial that will enable end users to replicate this study in future years for this and additional study locations

Methodology



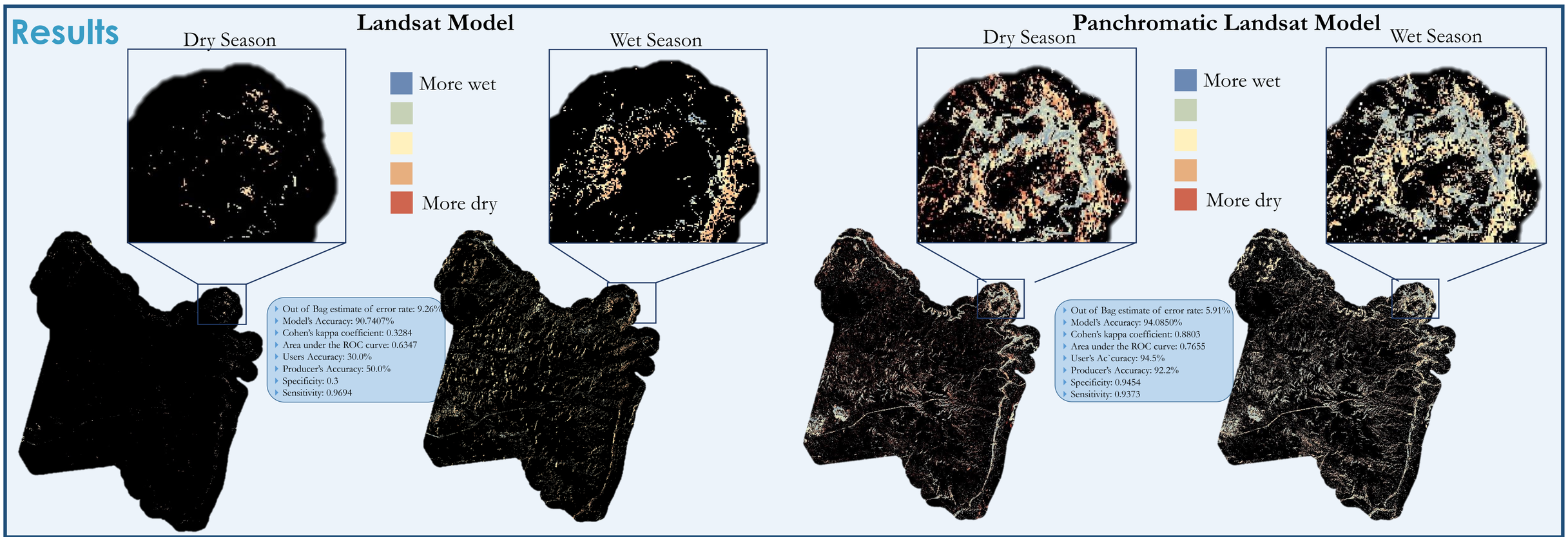
Earth Observations


Landsat 8


Sentinel-1


Shuttle Radar Topography Mission

Results



Team Members


Kristen Dennis
Project Lead


Anson Call


Gary Olds


Tim Mayer

Conclusions

- The model that employed the panchromatic sharpened technique had a higher resolution than the standard Landsat model and incorporated a less-skewed training data set. Comparatively, the panchromatic 15m Landsat model provided marked improvement to the standard 30m Landsat reflectance models, and more accurately displayed ephemeral surface water in distinct seasons.
- These maps and modelling approaches will support the USGS and BLM in developing habitat selection models for research of wild burro behavior.
- These modelling approaches and frameworks can be adapted to other studies and research projects, including that of the critically endangered African wild ass.

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